ClearSpeed™

Advance e720 Accelerator Card

User Guide

HP BladeSystem c-Class Type II Mezzanine Card

Document No. 06-UG-1588 **Revision:** 1.B

September 2008

Table of contents

Table of contents **2**

Preface **3**

Accessing documentation online 3

Contacting technical support. 3

1 Before you start **4**

1.1 Hardware prerequisites 5

1.2 How to get the driver software 5

1.3 Card installation 5

2 Features and general description **6**

2.1 Firmware 7

3 Troubleshooting - general guidelines **8**

3.1 Solving the problem 8

3.1.1 Finding the cause of the problem 8

3.1.2 Contacting ClearSpeed Support 8

4 Specifications **9**

4.1 PCI configuration space 9

4.2 Mechanical 9

4.3 Electrical 9

4.4 Thermal 9

4.4.1 Temperature monitoring 10

4.4.2 Temperature shutdown 10

4.5 Patents 10

Bibliography **11**

Preface

The guide describes the features of the Advance™ e720 accelerator card and gives you information on diagnostics, troubleshooting, and updating the firmware.

This guide also assumes that you have experience configuring Microsoft Windows XP, Red Hat® Enterprise Linux, or SUSE® Linux.

Accessing documentation online

You can view or download the documentation related to the Advance e720 accelerator board and associated software at:

http://support.clearspeed.com/documentation/

Contacting technical support

If you have technical questions about this product that are not answered in this documentation, check the solutions knowledgebase or contact ClearSpeed support at:

http://support.clearspeed.com/

1 Before you start

This chapter gives you an outline on what to do before you install your Advance e720 accelerator board. We recommend that you read the steps outlined in *Figure 1*.

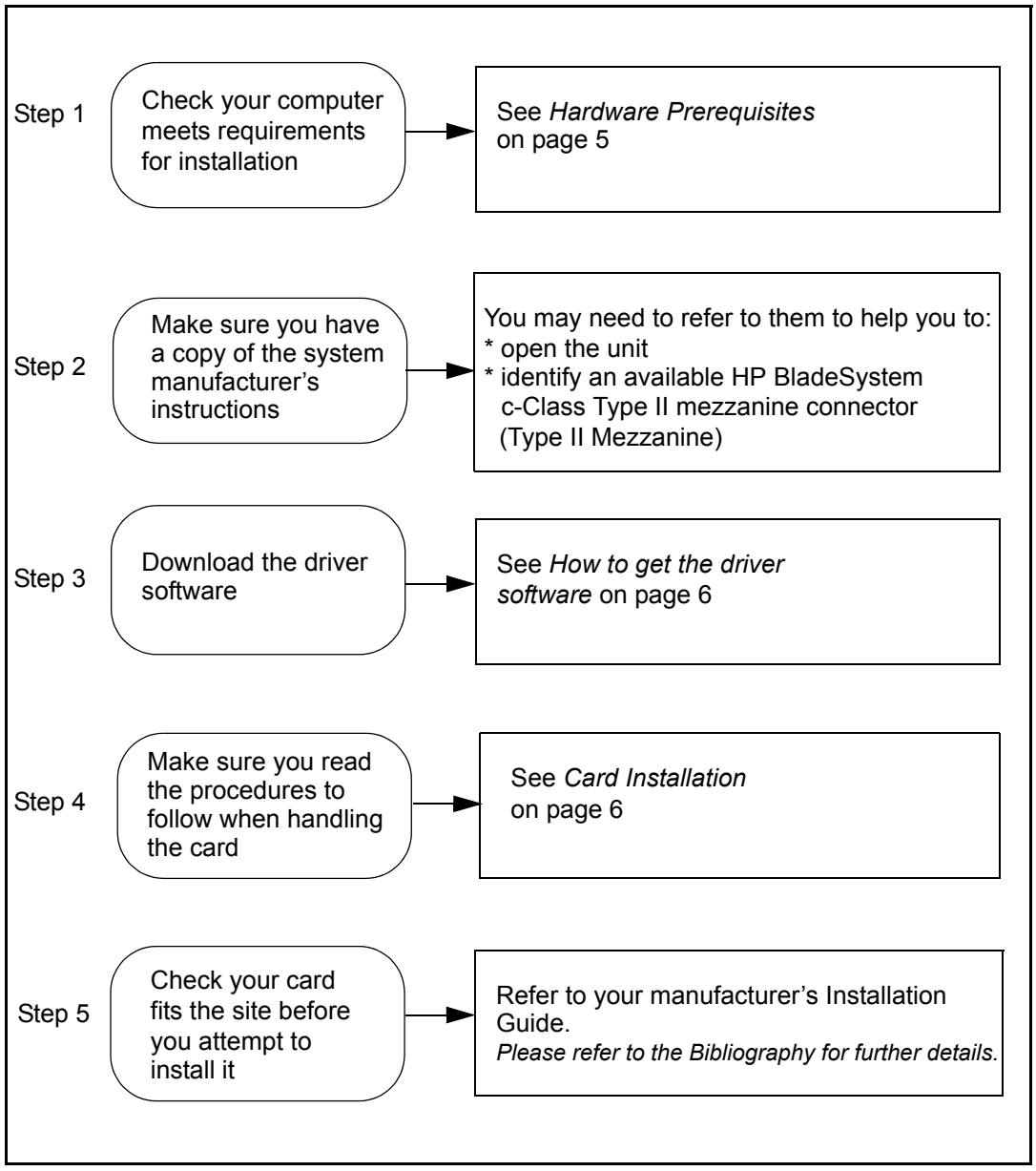
Step 1
Check your computer meets requirements for installation
See *Hardware Prerequisites* on page 5
Step 2
Make sure you have a copy of the system manufacturer's instructions
You may need to refer to them to help you to:
* open the unit
* identify an available HP BladeSystem c-Class Type II mezzanine connector (Type II Mezzanine)
Step 3
Download the driver software
See *How to get the driver software* on page 6
Step 4
Make sure you read the procedures to follow when handling the card
See *Card Installation* on page 6
Step 5
Check your card fits the site before you attempt to install it
Refer to your manufacturer's Installation Guide.
Please refer to the Bibliography for further details.

Figure 1. Guidelines to follow before you install

1.1 Hardware prerequisites

To install the Advance e720 accelerator board, you will need;

- an HP BladeSystem c-Class server or equivalent comprising of a 64-bit Intel or AMD x86 processor (or compatible).
- An available Type II mezzanine connection. See manufacturers instructions; *[1] on page 11*.

1.2 How to get the driver software

Before you can use the Advance e720 accelerator board, you must install the runtime package and the driver software. The latest versions of the software and software installation instructions can be found on the ClearSpeed support website:

http://support.clearspeed.com/

This website also provides the latest list of supported operating systems.

1.3 Card installation

The ClearSpeed Advance e720 Accelerator card is a Type II Mezzanine card. The type determines where it can be installed in the server blade. Refer to your manufacturer's detailed installation instructions to identify and install the Advance e720 Type II card (refer to *[1] on page 11*).

Caution: It is very important when inserting the card to observe the following(1):

- Always follow the precautions for handling electrostatic sensitive devices by using the antistatic wrist strap provided.
- Always follow the instructions provided by your system manufacturer when installing new hardware.
- Do not use excessive force when inserting the Advance e720 accelerator board into the mezzanine connector as this can damage the motherboard.

1. Please refer to the HP Blade Server User Guide for HP specifc control processes.

2 Features and general description

The Advance e720 accelerator card (shown in *Figure 2*) is based on the CSX700 double-precision, floating-point accelerator. It is designed for use in HP blade servers and systems that provide Type II mezzanine compatible connectors.

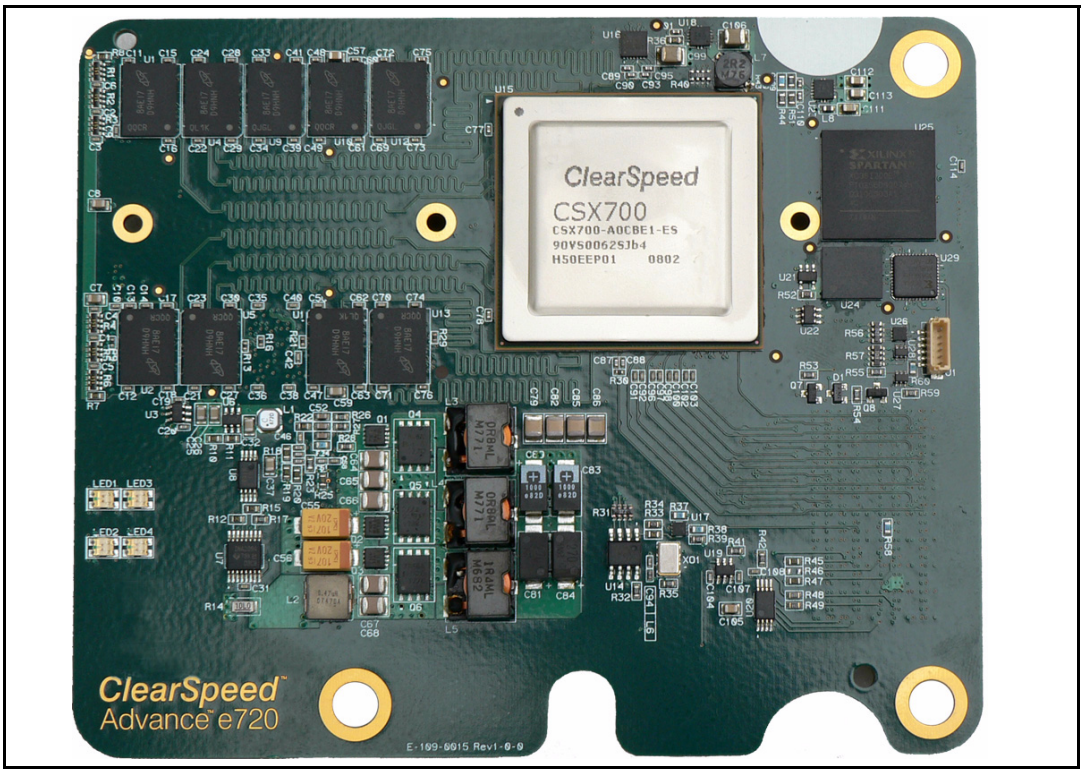

Figure 2. Advance CSX700 mezzanine card.

The Advance e720 accelerator card uses a single CSX700 processor. The processor implements the PCI Express host interface, permitting high data transfer rates directly with the processor. To manage the e720, an FPGA device is used. The firmware represents the FPGA design image and can be upgraded, as described in the [5], Firmware Update Release Notes.

The Advance e720 accelerator card uses dual channel bus-mastering DMA to achieve a high peak bandwidth to the host system. Each card has 2 GBytes of local card memory with error correction. It includes onboard temperature monitoring of the processor and board.

The Advance e720 accelerator card features the CSX700 data-parallel floating-point coprocessor. The processor is energy efficient providing 3.84 GFLOPS per watt (96 GFLOPS/25 watts). Each processor consists of two computation arrays, each are fully interconnected through a common address map, including access to the 1 GByte of local DDR2 SDRAM attached to each array, giving a total of 2 GBytes for the card. The DRAM is 72 bits wide, including 8 bits of error correcting code (ECC). This allows correction of single-bit errors and detection of multiple-bit errors.

2.1 Firmware

Board level management is implemented in an FPGA. At power-on, the FPGA logic configuration is loaded from a flash memory device. The contents of the flash device can be re-programmed to upgrade functionality or performance using a software utility supplied by ClearSpeed. This utility runs on the host system and reprograms the flash device through the Advance e720 accelerator card's register space.

For more detailed information, see *[4]: Firmware Installation Guide*.

3 Troubleshooting - general guidelines

If you encounter an error when using the Advance e720 accelerator board, you need to isolate the cause of the problem.

When installing multiple cards and software in a system, install each in turn and restart the system each time. Similarly, if you have already installed the Advance e720 accelerator board and software and you experience problems, remove or uninstall each in turn to establish which one is causing the problem.

3.1 Solving the problem

3.1.1 Finding the cause of the problem

To find out what is causing the problem, we recommend that you check the following:

- Check your Advance e720 accelerator board is installed correctly. See the relevent HP Blade Server User Guide(1).
- Check you installed the drivers correctly.

Whenever you fix a problem and reboot, run the tests again.

3.1.2 Contacting ClearSpeed Support

If none of the above helps solve your problem, refer to the ClearSpeed solutions knowledgebase or you can report your problem by submitting an online report via the ClearSpeed support website at:

http://support.clearspeed.com/support/solutions/

1. You may use the Hewlett Packard BladeSystem c-Class Onboard Administrator software, or the BladeServer's Lights Out remote management feature, to confirm installation of the ClearSpeed e720 Mezzanine Card. Refer to the HP Onboard Administrator or HP iLO2 documentation for full details.

4 Specifications

This chapter lists the specifications for the Advance e720 accelerator board.

4.1 PCI configuration space

Table 1 shows the register values for the Type 00h PCI configuration space header.

Vendor ID =	0x1942
Device ID =	0xE711
Classcode ID =	0x0B4000 (Co-processor)
Subsystem Vendor ID =	0x1942
Subsystem ID =	0xE731

Table 1. Register values for PCI configuration space

4.2 Mechanical

The Advance e720 accelerator board is compliant with with *PCI Express Specification Revision (1.1)* and the HP BladeSystem c-Class Mezzanine card Common Specification.

The Advance e720 is a Type II mezzanine card format.

4.3 Electrical

The power requirements for the Advance e720 accelerator board are outlined in *Table 2*.

Feature	Specification
Current	0.5A @ 3.3 V 2.1A @ 12 V
Maximum power consumption	25W (25W dissipation is application dependant)
Thermal design power	25W

Table 2. Power requirements

4.4 Thermal

To keep the CSX700 cool, the Advance e720 accelerator card is fitted with a passive heatsink. The passive heatsink is an aluminium finned radiator that dissipates heat through convection. For the passive heatsinks to work, they require airflow moving across the fins.

To ensure that the Advance e720 accelerator board is operating within the published limits, the BladeSystem's ambient operating temperature should be as specified in *Table 3*.

Condition	Operating specification	Storage specification
Temperature	10°C to 35°C (50°F to 95°F)	-10°C to 70°C (14°F to 158°F)
Relative humidity	10 to 90% noncondensing	up to 90% noncondensing

Table 3. Specifications for ambient conditions

4.4.1 Temperature monitoring

The CSX700 and the FPGA contain on-die temperature-sensing diodes which are connected to temperature-monitoring devices. Each device measures the remote temperature (temperature of the measured die) and the local temperature (temperature of the monitor chip itself). The temperature monitors signal warnings if the temperatures rise above the thresholds shown in *Table 4*.

Measurement	Temperature thresholds	
	Alert	Critical
Local temperatures	85°C (185°F)	N/A
Remote (die) temperatures	90°C (194°F)	110°C (230°F)

Table 4. Temperature warning thresholds

There are two warnings:

- Temperature alert. This provides an indication to the driver software that the device is becoming hot.
- Critical temperature. This turns off the device before it gets hot enough to cause permanent damage.

4.4.2 Temperature shutdown

When the CSX700 reaches a critical temperature it is immediately held in reset so that it can cool and avoid being damaged. When the CSX700 has cooled by more than 25°C from the critical threshold, it is brought out of reset.

Following a critical temperature reset your blade server may require a reboot to reconnect to the ClearSpeed e720.

4.5 Patents

This product is protected by US Patent 7346722 and 7363472; UK patents 2341770, 2348980, 2348984, 2348974, 2348973, 2348971, 2391093, 2394815 and 2390506, or international equivalents. Other patents pending.

Bibliography

[1] *HP BladeSystem c-Class Mezzanine Card Installation Instructions (HP Part Number 413773), for example:* http://h20000.www2.hp.com/bc/docs/support/SupportManual/c00700793/c00700793.pdf

[2] *Software Installation Instructions for Linux*
Document Numbers: 06-UG-1328
ClearSpeed Technology

[3] *Software Installation Instructions for Windows XP*
Document Numbers: 06-UG-1329
ClearSpeed Technology

[4] *Firmware Installation Guide*
http://support.clearspeed.com/downloads/firmware/
Document Number: 02-XX-1510
ClearSpeed Technology

ClearSpeed Technology, Inc.
800 West El Camino Real
Suite 180
Mountain View, CA 94040

Tel: +1 650 943 2329
Fax: +1 650 962 1188

ClearSpeed Federal Systems, Inc.
228 Hamilton Avenue, 3rd Floor
Palo Alto, CA 94301

Tel: +1 650 798-5027
Fax: +1 650 798-5001

ClearSpeed Technology plc
3110 Great Western Court
Hunts Ground Road
Bristol BS34 8HP
United Kingdom

Tel: +44 (0)117 317 2000
Fax: +44 (0)117 317 2002

Email: info@clearspeed.com

Web: http://www.clearspeed.com

Support: http://support.clearspeed.com

HP is a registered trademark of Hewlett-Packard Development Company, L.P., a Texas Limited Partnership

1. Information and data contained in this document, together with the information contained in any and all associated ClearSpeed documents including without limitation, data sheets, application notes and the like ('Information') is provided in connection with ClearSpeed products and is provided for information only. Quoted figures in the Information, which may be performance, size, cost, power and the like are estimates based upon analysis and simulations of current designs and are liable to change.
2. Such Information does not constitute an offer of, or an invitation by or on behalf of ClearSpeed, or any ClearSpeed affiliate to supply any product or provide any service to any party having access to this Information. Except as provided in ClearSpeed Terms and Conditions of Sale for ClearSpeed products, ClearSpeed assumes no liability whatsoever.
3. ClearSpeed products are not intended for use, whether directly or indirectly, in any medical, life saving and/ or life sustaining systems or applications.
4. The worldwide intellectual property rights in the Information and data contained therein is owned by ClearSpeed. No license whether express or implied either by estoppel or otherwise to any intellectual property rights is granted by this document or otherwise. You may not download, copy, adapt or distribute this Information except with the consent in writing of ClearSpeed.
5. The system vendor remains solely responsible for any and all design, functionality and terms of sale of any product which incorporates a ClearSpeed product including without limitation, product liability, intellectual property infringement, warranty including conformance to specification and or performance.
6. Any condition, warranty or other term which might but for this paragraph have effect between ClearSpeed and you or which would otherwise be implied into or incorporated into the Information (including without limitation, the implied terms of satisfactory quality, merchantability or fitness for purpose), whether by statute, common law or otherwise are hereby excluded.
7. ClearSpeed reserves the right to make changes to the Information or the data contained therein at any time without notice.

© Copyright ClearSpeed Technology plc 2008. All rights reserved.

Advance is a registered trademark of ClearSpeed Technology plc

ClearSpeed, ClearConnect, Advance and the ClearSpeed logo are trade marks or registered trade marks of ClearSpeed Technology plc. All other brands and names are the property of their respective owners.